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Manager,
Office of River Protection
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Program rewards WTP workers



Office of River Protection Manager Roy Schepens congratulates more than 975 Bechtel National, Inc. employees hired from local building trades unions during a Sharing for Success program recognition ceremony in December at Hanford's Waste Treatment Plant construction site.

Christmas came early for more than 975 Bechtel National, Inc. employees hired from local building trades unions. In recognition of their excellent 2003 safety record and work performance, the craft workers at the Hanford vitrification plant received bonus checks in December totaling \$1.7 million.

The bonus checks are part of Bechtel National's Sharing for Success program that rewards construction workers for meeting or exceeding strict safety and work-performance goals at the \$5.7 billion Waste Treatment Plant being built for the Department

(Continued on page 3.)

Retrieval of single-shell tank C-106 nears completion

As of *River Sentinel* press time, CH2M HILL Hanford Group was very close to completing the retrieval of single-shell tank C-106, one of the oldest waste tanks at Hanford and the first to be emptied of waste. The pioneering work to remove waste from this tank has influenced ongoing tank retrievals and will determine some of the methods used in the tank cleanups that lie ahead.

congressional watch list. After a misrouted transfer of strontium waste from the B Plant processing facility in the 1970s, the waste inside C-106 became so hot it boiled. The heat problem was solved in the late 1990s with the transfer of 186,000 gallons of waste, containing about 4.4 million curies of radioactivity, to another tank. The original cost to remove the heat-bearing sludge was around \$100 million.

Built in 1943, tank C-106 was once on the

Removal of the "hard heel" of waste from C-106

(Continued on page 3.)



Office of River Protection



Welcome to the inaugural edition of the *River Sentinel*, a new publication brought to you by the U.S. Department of Energy's Office of River Protection, with Bechtel National and CH2M HILL Hanford Group.

With this publication we hope to give you a quarterly glimpse into cleanup activities across the River Protection Project. We'll give you updates on the construction of the Waste Treatment and Immobilization Plant, the largest radiochemical treatment plant to be constructed and operated anywhere in the world; the ongoing evaluations of supplemental treatment technologies; and work in the tank farms that ranges from interim closing the first single-shell tank to removing, packaging and preparing to ship transuranic tank waste off-site.

Our goal in bringing you the *Sentinel* is simple: provide a way for our employees to regularly receive River Protection Project-wide news. We feel it's important for all employees to understand how their work in the tank farms, on potential supplemental treatment, and on the WTP fit together to form a project that will retrieve, treat and dispose of Hanford's tank waste and close the tank farms.

This quarter's edition of the *Sentinel* includes an update on a first for Hanford: the interim closure of single-shell tank C-106. Right now, we're in the final stages of retrieval – removing waste from the tank using the technologies available to us. Next will be a regulatory process that will result in a permit in April from the Washington State Department of Ecology to interim close C-106.

Recently, it's been suggested that the Department of Energy intends to simply rename high-level waste in Hanford's tanks in order to avoid treatment. Nothing could be further from the truth. There is a process defined in the Tri Party Agreement for the retrieval and closure of Hanford's single-shell tanks, and we remain committed to that process and to treating all of the high-level waste faction.

We'll provide updates on C-106 and other projects in coming editions of the *Sentinel*, as well as articles that focus on safety, on working with local and small businesses in the region and on the natural environment of the Hanford Site, as well as stories on how you employees are making a difference in our community.

In the meantime, please enjoy the first issue of the *Sentinel* and feel free to let us know how we're doing or what you'd like to see in future editions.

A handwritten signature in black ink that reads "Roy J. Schepens".

Roy Schepens
January 2004

Program Rewards

(continued from page 1)

of Energy's Office of River Protection.

The premise for the Sharing for Success program is simple: When the workforce exceeds safety and efficiency goals, they receive a sizable portion of the money they save the Waste Treatment Plant Project. Bonus checks are handed out quarterly if the goals are met, and workers are eligible for an additional annual bonus.

This is the third consecutive quarter the vitrification project craft workforce has earned bonuses, with total payments of more than \$2.9 million over the past 12 months. "Our union workforce is among the best I've seen in my 30 years with Bechtel," says WTP Project Director Jim Henschel. "Their commitment to safety and dedication to constructing a quality plant on schedule and within cost is second to none. The Sharing for Success program is our way to recognize their efforts and thank them for a job well-done."

Roy Schepens, manager of the Department of Energy's Office of River Protection, said, "Worker safety is our core value on this large and complex project. Bechtel National's workforce embodies our vision for a safe and productive working environment at Hanford."

Since the inception of the project in early 2001, Waste Treatment Plant manual and non-manual employees have worked more than 13.7 million hours with just two lost-time injuries. Over the past five months, the manual workforce accumulated more than 550,000 hours worked with only four recordable injuries, capping off a year that saw a 60 percent decline in injuries from 2002 while the size of the workforce doubled.

C-106 nears completion

(continued from page 1)

was a first-of-its kind challenge and began in earnest with the removal of a heel jet pump early in 2003. The 50-year-old pump, corroded from years of heating and cooling cycles and the high humidity in the tank, was stuck in place. Removal operations included the use of mechanical wedges, hydraulic jacks and a crane. On April 1, 2003, 18,000 gallons of liquid waste were transferred from C-106 into double-shell tank AY-102.

In August 2003, CH2M HILL initiated waste dissolution and retrieval using oxalic acid. To increase the sluicing effectiveness, a second

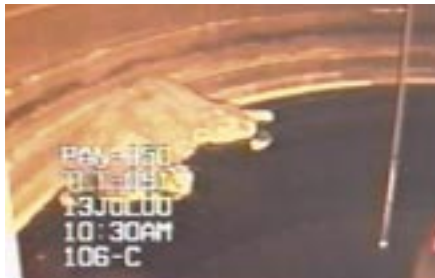
sluice nozzle was installed in November. Through six repetitive acid campaigns and four sluicing campaigns, over 12,000 gallons of solid waste were removed and transferred to the double-shell tank system.

The removal of the C-106 "hard-heel" has been completed at an approximate cost of \$20 million. With the addition of the last batch of oxalic acid to dissolve the remaining waste and the subsequent sluicing campaign, CH2M HILL will remove the last of the recoverable waste in the tank.

"We are accomplishing our mission of waste removal from tanks that have exceeded their design life," said Keith Carpenter, project manager, C-106 Retrieval.



A bird's-eye view of the C tank farm.



Tank C-106 contained sludge and "hard-heel" waste.



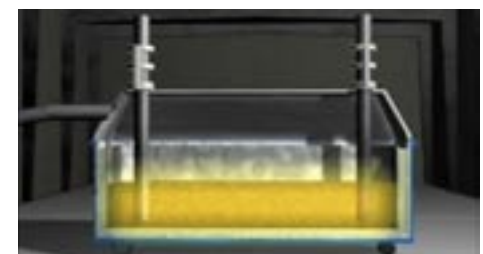
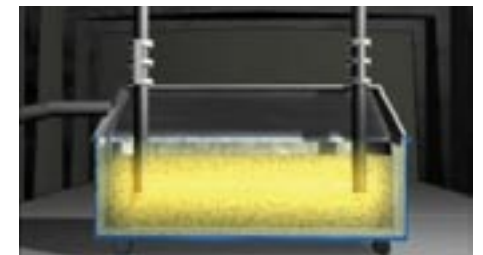
The sluicing campaigns in tank C-106 removed over 12,000 gallons of solid waste.

Bulk vitrification selected for pilot test

CH2M HILL Hanford Group has decided to enter into negotiations with AMEC Earth and Environmental, Inc., on a contract for a pilot supplemental-treatment test and demonstration facility. To meet Tri-Party Agreement milestones for completion of tank waste treatment by 2028, a supplemental method was required to be tested and evaluated by 2006.

AMEC's bulk vitrification method was selected through a long, difficult process that involved the Environmental Protection Agency, the Department of Energy and the Washington State Department of Ecology. After a period of testing and evaluation of 22 different technologies, bulk vitrification showed the most promise for meeting mission needs safely with a reduced cost to the taxpayers.

CH2M HILL Hanford Group hopes to have the contract in place within the next two months.



This 3-D illustration series shows the bulk vitrification process.

Remotely operated system inspects double-shell tank wall integrity

CH2M HILL Hanford Group is employing a remotely controlled non-destructive examination system to inspect the difficult-to-reach, high-stress lower knuckle region of the double-shell tanks' primary wall. The system looks for stress-corrosion cracking and is used as one method to determine the tanks' fitness to store waste. The Pacific Northwest National Laboratory designed the system, which uses the advanced signal processing methods called Synthetic Aperture Focusing Technique, or SAFT, and the Tandem SAFT, or T-SAFT.



T-SAFT system is being tested on a tank-wall mockup.

In the double-shell tanks, the primary tank is made of plates of carbon steel that are welded together. The upper tank wall portions and welds are examined using conventional ultrasonic equipment to detect pitting, thinning and cracking. The SAFT/T-SAFT system is used to examine the high-stress knuckle region—where the side wall meets the tank bottom. The curved shape of the steel at the knuckle is subject to stresses that are different from the vertical tank walls and the horizontal bottom. The highest stress area, and the area believed to be the most susceptible to stress-corrosion cracking, is located where the tank knuckle meets the concrete pad underneath the tank. This area is also difficult to reach and examine with conventional ultrasound equipment.

The SAFT/T-SAFT is mounted on a magnetic-wheeled crawler, which is deployed through a 24-inch riser between the secondary tank steel wall and the primary tank steel wall. The data acquisition and imaging software reside on a computer located outside the tank. The complete system is known as Remotely Operated Nondestructive Examination, or RONDE.

The SAFT/T-SAFT uses two transducers to transmit an ultrasound signal that travels through the lower tank knuckle to detect flaws in the metal. The SAFT technique provides a detection and location method for cracks in the knuckle region. T-SAFT uses the two transducers in a pitch-catch mode to determine the length and depth of the crack.

T-SAFT examines a 12-inch-by-20-inch area at a time without having to move the crawler. The overall inspection covers 20 circumferential feet of the tank knuckle, and can be accomplished during two, 10-hour shifts. The data collected from 20 circumferential feet are statistically

representative of the entire tank knuckle region.

The SAFT/T-SAFT examination is being performed on six of the 28 double-shell tanks. The six tanks were chosen because of their age, waste temperature, tank material composition and waste level. In the three tanks tested thus far—AW-102, AP-101 and AZ-102—SAFT/T-SAFT did not locate any stress-corrosion cracking. The six tanks chosen for lower-knuckle examination have been placed on a lifecycle schedule and will be re-examined every eight to ten years.

"This SAFT/T-SAFT system is just one of the tools we have to provide information to an independent, qualified, registered professional engineer who can declare the tanks fit for use to store waste. We are working with the Washington State Department of Ecology to ensure that the double-shell tanks comply with the state's Dangerous Waste Regulations for tank systems and can store waste safely," said Joel Eacker, CH2M HILL vice president, Project Delivery.

Washington state firm constructs NLD tank for Waste Treatment Plant

In the southwest corner of the Waste Treatment Plant Project construction site, just beyond the High-Level Waste Vitrification Facility, subcontractor Morse Construction Group of Everett, Wash., is safely constructing a large non-radioactive liquid discharge, or NLD, tank for Bechtel National, Inc.

The above-ground, 640,000-gallon tank will be the collection point for non-radioactive, non-dangerous liquids generated from the WTP including its cooling tower, steam plant and process facilities. An associated NLD pump house, which will be built adjacent to the tank, will safely transfer the effluent liquids from the WTP to the Hanford Site's Treated Effluent Disposal Facility.

"Morse Construction is working to provide a product that complements our commitment to safety excellence and high-quality standards on this large project," said Construction Site Manager Ken Hollenbach. "We welcome their staff as they have been a fine addition to our skilled construction team."

Morse Construction is over half complete with the 43-foot-high-by-50-foot-wide cylindrical structure. The tank is being assembled by welding prefabricated ring sections into place. The rings are transported to the WTP Project construction site from a shop in Everett, and assembled by Morse Construction's skilled union boilermakers in the field. So far, the subcontractor has completed welding all six ring sections into place.

Morse Construction is a local Pacific Northwest firm that has a contract to design, fabricate and erect eight tanks for the WTP Project. The other storage tanks associated with its contract include: a raw water tank, a process service water tank, a domestic water tank, a demineralized water tank, a fuel oil tank and two fire-water tanks. Morse Construction began its fieldwork in late October 2003 and expects to complete its contract scope this spring.

"Involving local business brings added value and expertise to the WTP Project," said Manager of Field Subcontracts Administration Jerry Calvey. "Morse Construction has just begun its scope of work on this large and complex project. We look forward to them having continued success in building the seven additional tanks."



The 640,000-gallon non-radioactive liquid discharge tank, being constructed by Waste Treatment Project subcontractor Morse Construction Group of Everett, Wash., is about half complete.

Hanford Vit Plant taking shape



A plant wash system vessel is lowered into the Waste Treatment Plant Pretreatment Facility. This vessel is part of the system that will be used to receive, transfer and store tank waste.

In 2003 the Hanford Waste Treatment Plant began taking shape as three large concrete structures rose above the desert landscape. Those structures form the core of what will become the world's largest radioactive waste treatment plant, capable of treating all of Hanford's high-level radioactive tank waste and a large portion of the low-activity waste. The final product will be a stable glass that will immobilize the waste and isolate it from the environment for thousands of years.

The Waste Treatment Plant is composed of three major facilities—Pretreatment, Low-Activity Waste Vitrification and High-Level Waste Vitrification—a large Analytical Laboratory, dozens of support buildings and an array of utilities needed to support the

project. Overall project design is about 56 percent complete, with construction following at about 26 percent complete. The plant is scheduled to be in full operation in 2011. All of Hanford's tank waste is to be treated by 2028.

The foundations and basement walls are complete for the Pretreatment Facility, Low-Activity Waste Vitrification Facility and the High-Level Waste Vitrification Facility. Work is currently progressing on walls above ground level. Construction of the Analytical Laboratory is scheduled to begin later this year.

In 2004, design will continue on portions of the facilities and equipment, but the major project focus will shift to construction.

Here is a summary of progress on the Waste Treatment Plant since construction began in late 2001:

- Completed a two-story, 60,000-square-foot construction office building
- Erected a 30,000-square-foot warehouse
- Built a 30,000-square-foot fabrication shop
- Moved more than 1.2 million cubic yards of earth
- Placed more than 87,000 cubic yards of concrete
- Installed 103,600 feet of piping
- Installed about 172,500 feet of electrical raceway
- Put in more than 72,500 pounds of heating, ventilation and air-conditioning ductwork
- Began erecting structural steel in July 2003, a month before the Tri-Party Agreement milestone
- Set the High-Level Waste Facility submerged bed scrubber condensate vessel in November, a month ahead of the contract performance milestone.

Tank Farm contractor progresses on waste tank cleanup

This past year, CH2M HILL Hanford Group, the Office of River Protection's tank farm contractor, made good progress in the effort to clean and close Hanford waste tanks.

At press time, CH2M HILL noted the following accomplishments:

- The interim stabilization milestone was met one month early. CH2M HILL employees removed 98 percent of liquids from the single-shell tanks and retrieved more than 3 million gallons, thereby reducing the risk to the environment.
- Single-shell tank C-106 retrieval is nearly complete, and retrieval of the waste in single-shell tank S-112 is approaching the halfway mark.
- The 244-AR Vault was emptied six weeks early, and more than 19,000 gallons of waste were transferred to double-shell tanks.
- Bulk vitrification was selected as the supplemental treatment option for pilot testing.
- Projects to upgrade existing systems and provide new transfer systems to the Waste Treatment Plant are well under budget and ahead of schedule.
- The 242-A Evaporator and the 222-S Laboratories were transferred to CH2M HILL.
- Worker safety continued to be addressed and improved by adding two decontamination trailers, sealing tanks to control vapor release pathways and offering a wider range of respiration protection.
- Improvements in work management streamlining and conduct of operations resulted in reductions in errors and system disruptions.

Triathlete competes in New Zealand



Newland

The Thanksgiving feast had barely settled when John Newland, a scheduler for Mission Control at CH2M HILL Hanford Group, and his wife Susan boarded the plane for a long trip to Queenstown, New Zealand, where he competed in the World Championship Triathlon on Dec. 6.

Newland competed in the men's 45-to-49-year division and placed 30th in the world and 7th on his team. During the race he swam 1,500 meters, cycled 40 kilometers and ran 10 kilometers in 2 hours, 25 minutes and 59 seconds.

This is the length of the Olympic course—a short-course triathlon—and a number of the participants were competing to qualify for the 2004 Olympics in Athens.

Although he does not seek Olympic gold, Newland enjoys the sport and the competition. He began training in the Tri-Cities five years ago and has participated in regional races. A 2002 win in the Triathlon in Coeur d'Alene, Idaho qualified him for a spot on the national team that traveled to New Zealand.

"I am happy with my performance, and impressed with the level of excellence and sportsmanship among the competitors. The spectators were very patriotic, most were rooting for the Aussies or the Kiwis, but when I heard the isolated voices 'Go USA!' along the course, I knew it was for me," Newland said.

Before he left on his own flight, he had to ship his bicycle separately, disassembled in a large mattress-sized carrying case. When it finally arrived in Queenstown, Newland had to reassemble it and then spent a day cycling to familiarize himself with the course.

Because it is in the southern hemisphere, the season in New Zealand was late spring. On the day of the race, the temperature was a comfortable 70 degrees Fahrenheit, but a blustery wind whipped up the waves on Lake Hayes, where the swim portion of the competition took place. In spite of the chop, Newland turned in his best swim time ever. He attributes his success to training with a tough coach in the Tri-Cities.



Canada geese are familiar residents along the Columbia River's Hanford Reach

Whether you scan the skies on a workday to locate their honking "V" formation, notice them grazing in your favorite park, or enjoy them for a holiday meal, Canada geese are well-known to residents of the lower mid-Columbia Basin.

Most of the geese observed around the Tri-Cities and Hanford belong to a race known as the western Canada geese. The geese that are found in the city parks and golf courses are those that live in and around the Columbia River and feed on the leftover grain and stubble of agricultural land surrounding the towns. Geese that nest on the islands of the Hanford Reach tend to stay close to the Columbia River most of their lives.

Male and female birds have the same plumage and markings and mate for life. Adult birds weigh about six to sixteen pounds. The birds eat plants and nest on the ground near water among vegetation that provides some cover. Females lay four to ten eggs.

Scientists at Hanford have been studying the geese since 1950, and researchers at the Pacific Northwest National Laboratory have over 50 years of data on nesting, migration and tissue samples. Studies evaluated nesting success, and over time the studies revealed that coyotes, members of the mink family and fluctuating water levels were the main causes for hatching failure.

Wildlife researchers found that if the nests were destroyed by predators or were abandoned after being flooded, the geese would attempt to nest in a different location. The success of this second attempt can be dependent upon the female's health and her ability to select a safer location.

PNNL research scientist Brett Tiller said, "Canada geese have strong homing instincts to their nesting locations. They use the North Star to help navigate during their seasonal migrations and may also sense different electromagnetic fields around the earth. The geese return to the location of their birth to nest themselves." Offspring return to the safer nesting sites and establish nests for another generation.

On the Hanford Reach in late spring, PNNL scientists round up adults and goslings to place an identifying leg band on the birds. The leg bands have assisted scientists in determining the migration range of the geese. Although most of the geese find life agreeable within an 80-kilometer radius of the Hanford Reach, some young banded birds join the northern migration for a period of time and then return in the autumn after their first molt.

Banded geese have been found as far away as the Northwest Territory in Canada, Illinois and central California. Banding also assists in determining life expectancy, which ranges from five to ten years. A few Hanford-banded birds have lived to the ripe old age of 20 years.



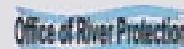
Canada geese

Calendar of Events

Hanford Advisory Board Meeting
Feb. 5, 9 a.m.-5 p.m. and Feb 6, 8:
30 a.m.- 4:30 p.m., Red Lion Hotel
Richland, 802 George Washington
Way, Richland, Erik Olds 372-8656.

The *River Sentinel* is published quarterly for all employees of the Office of River Protection and its contractors.

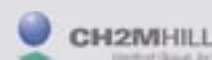
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